

Table 1
B. Braun Medical Inc.
2016 Emissions Calculations
Sterilizers

Sterilizer	EtO Usage ^(a)	EtO Emission Rates			
		Scrubber ^(b)	Catalytic Oxidizer ^(b)	Fugitives ^(d)	Total
	(lbs/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
Sterilizer 101	18,289	0.09	N/A	0.25	0.3408
Sterilizer 102	19,775	0.10	N/A	0.25	0.3482
Sterilizer 103	14,588	0.07	N/A	0.25	0.3223
Sterilizer 104	7,943	0.04	N/A	0.25	0.2891
Sterilizer 105	23,676	0.12	N/A	0.25	0.3678
Sterilizer 106	9,347	0.05	N/A	0.25	0.2961
Sterilizer 107	47,935	0.24	N/A	0.25	0.4890
Sterilizer 108	44	0.00	N/A	0.25	0.2496
Aeration Room	N/A	N/A	0.48	N/A	0.4801
Total	141,597	0.71	0.48	1.75	3.18

^(a) EtO usage determine from 2015 facility usage records.

^(b) Emission rates from the scrubber and catalytic oxidizer controlling the sterilizers are calculated using the EtO usage and the following information:

Scrubber Control Efficiency:	99	% ^(c)
Maximum EtO Concentration:	1.0	ppm ^(c)
EtO MW:	44	lb/lb-mol
Catalytic Oxidizer Rated Capacity:	16,000	cfm
Combined Sterilizer Rear Chamber Exhaust Volume	4,000	cfm

^(c) As required by 40 CFR Part 63, Subpart O.

^(d) Fugitive emission rates as calculated based on B. Braun's engineering judgment.

Summary of Sterilizer Emission Rates

Pollutant	Scrubber ^(b)	Catalytic Oxidizer ^(b)	Fugitives	Total Emissions
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
VOC	0.71	0.48	1.75	3.18
Ethylene oxide	0.71	0.48	1.75	3.18

Table 2
B. Braun Medical Inc.
2017 Emissions Calculations
Sterilizers

Sterilizer	EtO Usage ^(a)	EtO Emission Rates			
		Scrubber ^(b)	Catalytic Oxidizer ^(b)	Fugitives ^(d)	Total
	(lbs/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
Sterilizer 101	13,555	0.07	N/A	0.25	0.32
Sterilizer 102	15,086	0.08	N/A	0.25	0.32
Sterilizer 103	14,738	0.07	N/A	0.25	0.32
Sterilizer 104	11,187	0.06	N/A	0.25	0.31
Sterilizer 105	8,180	0.04	N/A	0.25	0.29
Sterilizer 106	1,062	0.01	N/A	0.25	0.25
Sterilizer 107	30,256	0.15	N/A	0.25	0.40
Sterilizer 108	174.00	0.00	N/A	0.25	0.25
Aeration Room	N/A	N/A	0.48	N/A	0.48
Total	94,238	0.47	0.48	1.75	2.95

^(a) EtO usage determine from 2015 facility usage records.

^(b) Emission rates from the scrubber and catalytic oxidizer controlling the sterilizers are calculated using the EtO usage and the following information:

Scrubber Control Efficiency:	99	% ^(c)
Maximum EtO Concentration:	1.0	ppm ^(c)
EtO MW:	44	lb/lb-mol
Catalytic Oxidizer Rated Capacity:	16,000	cfm
Combined Sterilizer Rear Chamber Exhaust Volume	4,000	cfm

^(c) As required by 40 CFR Part 63, Subpart O.

^(d) Fugitive emission rates as calculated based on B. Braun's engineering judgment.

Summary of Sterilizer Emission Rates

Pollutant	Scrubber ^(b)	Catalytic Oxidizer ^(b)	Fugitives	Total Emissions
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
VOC	0.47	0.48	1.75	2.95
Ethylene oxide	0.47	0.48	1.75	2.95

Table 3
B. Braun Medical Inc.
2018 Emissions Calculations
Sterilizers

Sterilizer	EtO Usage ^(a)	EtO Emission Rates			
		Scrubber ^(b)	Catalytic Oxidizer ^(b)	Fugitive ^(d)	Total
	(lbs/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
Sterilizer 101	47	0.00	N/A	0.17	0.17
Sterilizer 102	14,833	0.07	N/A	0.17	0.24
Sterilizer 103	13,217	0.07	N/A	0.17	0.24
Sterilizer 104	13,838	0.07	N/A	0.17	0.24
Sterilizer 105	13,988	0.07	N/A	0.17	0.24
Sterilizer 106	13,878	0.07	N/A	0.17	0.24
Sterilizer 107	30,088	0.15	N/A	0.17	0.32
Sterilizer 108	363	0.00	N/A	0.17	0.17
Aeration Room	N/A	N/A	0.48	N/A	0.48
Total	100,252	0.50	0.48	1.35	2.33

^(a) EtO usage determine from 2018 facility usage records.

^(b) Emission rates from the scrubber and catalytic oxidizer controlling the sterilizers are calculated using the EtO usage and the following information:

Scrubber Control Efficiency:	99	% ^(c)
Maximum EtO Concentration:	1.0	ppm ^(c)
EtO MW:	44	lb/lb-mol
Catalytic Oxidizer Rated Capacity:	16,000	cfm
Combined Sterilizer Rear Chamber Exhaust Volume	3,100	cfm

^(c) As required by 40 CFR Part 63, Subpart O.

^(d) Fugitive emission rates as calculated based on B. Braun's engineering judgment.

Summary of Sterilizer Emission Rates

Pollutant	Scrubber ^(b)	Catalytic Oxidizer ^(b)	Fugitives	Total Emissions
	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
VOC	0.50	0.48	1.35	2.33
Ethylene oxide	0.50	0.48	1.35	2.33

Table 4
B. Braun Medical Inc.
2019 Emissions Calculations
Sterilizers

2019			Scrubber Emissions ^{(a)(b)}	Rear Exhaust/Dry Bed Emissions ^{(a)(c)}				Fugitive Emissions ^{(a)(c)(d)}	Catalytic Oxidizer Emissions ^{(e)(b)}	Total Emissions
Source ID	Unit	EtO Usage (lb)		January - March Batches	April - December Batches	Rear Exhaust VOC/EtO Emissions (tons)	Dry Bed Scrubber VOC/EtO Emissions (tons)			
101	Sterilizer 101	54.00	2.70E-04	0.00	1.00	0.00	2.65E-06	0.12	N/A	1.91E-03
102	Sterilizer 102	17,548	0.09	89.00	340.00	0.02	9.03E-04		N/A	0.13
103	Sterilizer 103	16,385	0.08	79.00	343.00	0.02	9.11E-04		N/A	0.12
104	Sterilizer 104	17,806	0.09	103.00	352.00	0.03	9.34E-04		N/A	0.14
105	Sterilizer 105	20,856	0.10	82.00	350.00	0.02	9.29E-04		N/A	0.15
106	Sterilizer 106	10,169	0.05	76.00	118.00	0.02	3.13E-04		N/A	0.08
107	Sterilizer 107	47,728	0.24	83.00	304.00	0.02	8.07E-04		N/A	0.28
108	Sterilizer 108	151.00	7.55E-04	12.00	11.00	3.19E-03	2.92E-05		N/A	0.01
110	Aeration Room	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.48	0.48
Total		130,697	0.65	524.00	1,819	0.14	4.83E-03	0.12	0.48	1.40

^(a) The following emissions factors were used in development of this table. Refer to "Emissions Factors" tab for details regarding emissions factor basis.

Scrubber	1.00%
Rear Exhaust (ton/cycle)	2.65E-04
Dry Bed @ 99% Control Efficiency(ton/cycle)	2.65E-06
Fugitive (ton/yr)	0.12

^(b) Emission rates from the scrubber and catalytic oxidizer controlling the sterilizers are calculated using the EtO usage and the following information:

Scrubber Control Efficiency:	99	% ^(e)
Maximum EtO Concentration:	1.0	ppm ^(e)
Fugitive EtO Concentration:	2.0	ppm
EtO MW:	44	lb/lb-mol
	50	ppm
Catalytic Oxidizer Rated Capacity:	18,000	cfm
Combined Sterilizer Rear Chamber Exhaust Volume:	3,100	cfm
Fugitive Exhaust Volume:	6,758	cfm
Batch time (Venting Time)	30	min/batch
Cycles per week	98	cycles/week

^(c) Rear exhaust, dry bed and fugitive emission rates are calculated based on B. Braun's engineering judgment. The dry bed began operation in April 2019. Rear exhaust emissions only represent emissions from January 2019 through March 2019.

^(d) Fugitive emissions are those emissions from the sterilization process that are not routed to a pollution control device. Fugitive emissions generally occur from off-gassing associated with the handling of EtO prior to charging the sterilizer chamber, off-gassing of sterilized product following product transfer from the sterilizer chamber to the Aeration Room, and any off-gassing that may occur after product is removed from the Aeration Room.

^(e) As required by 40 CFR Part 63, Subpart O.

Table 5
B. Braun Medical Inc.
2020 Emissions Calculations
Sterilizers

2020			Scrubber Emissions ^{(a)(b)}		Donaldson Catalytic Oxidizer Emissions ^{(a)(b)}	Anguil Catalytic Oxidizer Emissions ^{(a)(c)}		Dry Bed Scrubber Emissions ^{(a)(d)}		Fugitive Emissions ^{(a)(d)(e)}	Total Emissions
Source ID	Unit	ETO Usage (lb)	ETO Usage (lb)	VOC/ETO Emissions (tons)	VOC/ETO Emissions (tons)	ETO Usage (lb)	VOC/ETO Emissions (tons)	Batches	VOC/ETO Emissions (tons)	VOC/ETO Emissions (tons)	VOC/ETO Emissions (tons)
			January - September				October - December				
101	Sterilizer 101	171.00	171.00	8.55E-04	N/A	0.00	0.00	4.00	8.56E-06	0.12	5.08E-03
102	Sterilizer 102	803.00	803.00	4.02E-03	N/A	0.00	0.00	21.00	4.50E-05		9.68E-03
103	Sterilizer 103	15,625	11,308	0.06	N/A	4,317	4.32E-04	404.00	8.65E-04		0.08
104	Sterilizer 104	13,840	10,482	0.05	N/A	3,358	3.36E-04	390.00	8.35E-04		0.07
105	Sterilizer 105	17,629	13,134	0.07	N/A	4,495	4.49E-04	403.00	8.63E-04		0.09
106	Sterilizer 106	17,260	12,639	0.06	N/A	4,621	4.62E-04	378.00	8.09E-04		0.08
107	Sterilizer 107	42,930	33,405	0.17	N/A	9,525	9.52E-04	358.00	7.66E-04		0.19
108	Sterilizer 108	68.00	39.00	1.95E-04	N/A	29.00	2.90E-06	12.00	2.57E-05		6.54E-03
110	Aeration Room	N/A	N/A	N/A	0.36	N/A	0.02	N/A	N/A	N/A	0.38
Total		108,326	81,981	0.41	0.36	26,345	0.03	1,970	4.22E-03	0.12	0.92

^(a) Emission rates from the sterilization process are calculated using the EtO usage and the following information:

Scrubber control efficiency:	99	% ^(f)
Donaldson Catalytic Oxidizer maximum EtO concentration:	1.0	ppm ^(f)
Donaldson Catalytic Oxidizer rated capacity:	16,000	cfm
Anguil Catalytic Oxidizer control efficiency when sterilizers are in use:	99.98	% ^(g)
Anguil Catalytic Oxidizer maximum EtO concentration when sterilizers are not in use:	0.7	ppm ^(g)
Anguil Catalytic Oxidizer rated capacity:	15,000	cfm
Aeration Room January - September 2020 operating hours:	6,576	hours ^(h)
Assumed Aeration Room operating hours without sterilizers:	48	hours/week
Aeration Room October - December 2020 operating hours without sterilizers:	624	hours
Assumed average concentration for duration of Dry Bed venting time:	50	ppm ^(d)
Batch time (venting time):	30	min/batch
EtO MW:	44	lb/lb-mol
Combined rear sterilizer chamber exhaust volume:	3,100	cfm
Combined rear sterilizer chamber exhaust volume to Dry Bed:	2,500	cfm
Dry Bed uncontrolled emissions factor:	2.65E-04	ton/batch ^(d)
Dry Bed controlled emissions factor:	2.14E-08	ton/batch ^(d)
Dry Bed control efficiency:	99	% ^(d)
Fugitive EtO concentration:	2.0	ppm ^(d)
Assumed fugitive batches per week:	98	batches/week
Fugitive exhaust volume:	6,758	cfm

^(b) Scrubber and Donaldson Catalytic Oxidizer operated through September 2020. The Scrubber and Catalytic Oxidizer controlled emissions from the Sterilizers and the Aeration Room, respectively.

^(c) Anguil Catalytic Oxidizer started up in October 2020. The Anguil Catalytic Oxidizer controls emissions from both the Sterilizers and the Aeration Room.

^(d) Dry bed and fugitive emission rates are calculated based on B. Braun's engineering judgment.

^(e) Fugitive emissions are those emissions from the sterilization process that are not routed to a pollution control device. Fugitive emissions generally occur from off-gassing associated with the handling of EtO prior to charging the sterilizer chamber, off-gassing of sterilized product following product transfer from the sterilizer chamber to the Aeration Room, and any off-gassing that may occur after product is removed from the Aeration Room.

^(f) As required by 40 CFR Part 63, Subpart O.

^(g) As demonstrated by initial source testing.

^(h) Assumes continuous operation.